

## CLAIMS

1. A knee prosthesis of the type comprising a femoral component (1) which is generally of metal and can be implanted in the femur, a tibial component (2) which is generally of metal and can be implanted in the tibia, and an intermediate component or insert (3) which is made of a plastic material such as polyethylene and is interposed between the tibial component and the femoral component, the insert being able to be made rigidly integral with the tibial component or movable in rotation about a vertical axis relative to the latter, the femoral component comprising, on the one hand, two lateral parts (7) with condylar surface which can bear and move in two lateral cavities (8) of appropriate profile in the insert, and, on the other hand, a hollowed central part (10) arranged between the lateral condylar parts and able to bear on a projecting central part (9) of the insert, the projecting central part (9) of the surface of the insert (3) directed toward the femoral component (1) having a convex shape, seen from the front, and a concave shape, seen in profile, while the intercondylar arch (10) of the femoral component (1) has a concave shape, seen from the front, and a convex shape, seen in profile, from the front to the rear of the femur, allowing it to straddle the projecting part (9) of the

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insert during its relative displacements and to cooperate with it in the manner of a cam, this prosthesis being characterized in that the surfaces of the femoral component (2) and of the insert (3) designed to come into contact during the relative movements of the two components do not have any discontinuity or sharp edge and cooperate by straddling of concave parts and convex parts during the totality of these movements in each of the sagittal and frontal planes, and in that, in cross section in a frontal plane, the contact surface of the insert (3) directed toward the corresponding surface of the femoral component and coming into continuous medio-lateral contact with the latter (1) is a curve (S2) which includes an incurved central portion (9) whose convexity is directed toward the femoral component and which connects tangentially on each side to a hollowed part (8) having a shape corresponding substantially to that of the associated condylar part of the femoral component (1), the whole forming an undulating curve without any discontinuity or sharp edge, of the general type of a sinusoid, and in that, in cross section in a frontal plane, the surface of the femoral component (1) directed toward the corresponding surface of the insert and coming into continuous medio-lateral contact with the latter (3) is a curve (S1) which includes a hollowed undulating central portion (9) whose concavity is directed toward the insert and which connects

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tangentially on each side to the condylar parts (7) of the femoral component (1), the whole forming an undulating curve without any discontinuity or sharp edge, of the general type of a sinusoid, following the entire articular surface of the femur and of the insert.

2. The prosthesis as claimed in claim 1, characterized in that the convex central projection (9) of the insert (3) directed toward the femoral component (1) connects to the hollowed lateral parts (8) of this insert via a curvature of constant radius ( $R'_2$ ) from front to rear.

3. The prosthesis as claimed in claim 2, characterized in that the hollowed central part (10) of the femoral component (1) connects to the lateral parts (7) of this component (1) via a curvature of constant radius ( $R_2$ ) from front to rear.

4. The prosthesis as claimed in one of claims 1 through 3, characterized in that the femoral contact surface is defined by the combination of a spiral curve in the sagittal plane and of an undulating curve of sinusoidal type in the frontal plane, and in that the contact surface of the insert is defined by the combination of a spiral curve in the sagittal plane and of an undulating curve of sinusoidal type in the frontal plane, the two surfaces having a concave-convex engagement in each of these two planes, the two surfaces having a continuous transverse contact from

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complete extension to complete flexion.

5. The prosthesis as claimed in claim 4, characterized in that, in a manner known per se, the condylar parts and the central part (7) of the femoral component (1) have, in cross section through a sagittal plane, the shape of a spiral, of any geometrical form, and in that, in cross section through a sagittal plane, the corresponding condylar parts and central part (9) of the insert (3) also have the shape of a spiral or any geometrical form.

6. The prosthesis as claimed in one of claims 1 through 5, characterized in that the projecting part (9) of the insert (3) and the hollowed part (10) of the intercondylar space of the femoral component (1) have, in the sagittal plane, two curvatures which cooperate in the manner of a cam and which are determined from X-rays of the movement of this joint, this cam being such that, at an angle of flexion of  $0^{\circ}$ , the center of the bearings of the femur on the insert is a few millimeters in front of the center of the insert (3) and such that this center retreats a few millimeters behind the center of the insert, starting from a certain degree of flexion of between  $15^{\circ}$  and  $20^{\circ}$ .

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